

ABSTRACT OF THE DISCLOSURE

A method and composition for removing silicon-containing particulate material, such as silicon nitrides and silicon oxides, from patterned Si/SiO₂ semiconductor wafer surfaces is described. The composition includes a supercritical fluid (SCF), an etchant species, a co-solvent, a surface passivator, a binder, deionized water, and optionally a surfactant. The SCF-based compositions substantially remove the contaminating particulate material from the wafer surface prior to subsequent processing, thus improving the morphology, performance, reliability and yield of the semiconductor device.